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FINANCIAL DEEPENING, INVESTMENT, AND GROWTH IN FRONTIER ECONOMIES: EMPIRICAL EVIDENCE FROM SUB-SAHARAN AFRICA

By

KIPROP, Samuel Kiprotich

THESIS

Submitted to
KDI School of Public Policy and Management
in partial fulfillment of the requirements
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MASTER OF DEVELOPMENT POLICY

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Committee in charge:

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ABSTRACT

FINANCIAL DEEPENING, INVESTMENT, AND GROWTH IN FRONTIER ECONOMIES: *EMPIRICAL EVIDENCE FROM SUB-SAHARAN AFRICA*

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Few studies on finance-growth relationship have attempted to explicate the channel(s) by which financial deepening influences growth, particularly in (SSA). In this study, I report two of those channels; investment in the real sector and financial stability. The study adopts a two-step bi-model approach. In the first step, I estimate the investment model to establish the multiplicative effect of financial depth and financial stability on the real sector. In the second step, I import the investment real sector (investment) variable into the growth function to measure its interactive value with financial deepening on growth of gross domestic product (GDP). The combined approach of interacting financial deepening, investment, and financial stability accords the study a fresh analytical mileage over previous studies on the finance-growth nexus by assuming a high frequency growth value of explanatory variable multiplicative effects. Using institutional and macro-economic variables from 8 frontier markets of SSA countries from 2001-2011, I run panel unobserved effects model to report robust results and policy implications.

In the absence of interaction term, the findings do not support the finance-led growth narrative. However, when interacted with real sector activity, the combined multiplicative effect is positive and significant. Similarly, there is strong evidence of the interactive role of financial system soundness and financial deepening in fostering real sector investment. The hypothesis that financial deepening confers growth benefits via real sector investment is affirmed when adjusted margins prediction is conducted. The policy implication of these findings suggests a need to coalesce financial resources into the real economy in an environment of tailored macroprudential policy.

Key words: Economic Growth, Financial Deepening, Frontier Economies, Financial Stability, Macro-prudential Regulation, Sub-Saharan Africa.

JEL Classification: 055; B26; C23;E22; F21; F41; G18; O11; 016

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DEDICATION

Dedicated to my loving Parents; Kiprop and Kobilo

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LIST OF ABBREVIATIONS

ATVR	Annualized Traded Value Ratio
BIS	Bank for International Settlements
EAFE	Emerging Market and Frontier Economies
EM	Emerging Market
FDI	Foreign Direct Investment
FE	Fixed Effects
FTSE	Financial Times Stock Exchange
GDP	Gross Domestic Product
GFDD	Global Financial Development Database
IFS	International Financial Statistics
IMF	International Monetary Fund
MSCI	Morgan Stanley Capital International
OECD	Organization for Economic Cooperation and Development
S&P	Standard and Poor's
SSA	sub-Saharan Africa

CHAPTER ONE

1.0. INTRODUCTION

From a theoretical and analytical point of view, it is a relatively well established fact that the level of financial deepening impacts growth. Theoretically, an increasingly deepening financial system (in which information asymmetry is bridged, risks are assessed and managed, and contractual obligations are honoured) is capable of positively propelling growth through allocating resources efficiently in a self-correcting mechanism. In this sense, macro-economic stability, *de facto* confers benefits for sustaining this growth via disciplined fiscal and monetary policy. There is consequently no analytical mileage in pursuing this line of relationship.

My inclination is therefore to introduce two pertinent issues. First, the "*how",* of the finance-growth nexus is interrogated by questioning the channels through which financial deepening positively impacts growth. Second, and perhaps more important, empirical exigencies regarding financial depth and financial stability and growth in SSA[1] has been avoided, perhaps as one that does warrant consideration given what most studies attribute to the fact that low levels of financial depth do not pose detrimental effects on the economic and financial system of low income countries .

One may argue that financial stability is a non-issue for SSA, rightly so, since the region has not faced significant disturbances in its financial system since the mid-1990s, partly because

[1] In defining SSA, this study follows that employed in International Monetary Fund's (IMF) publication, *Regional Economic Outlook: sub-Saharan Africa*, a bi-annual publication available at the institution's website www.imf.org.

of relatively low levels of financial development. Nonetheless, the economies of this region are not immune to exogenous contagion effects as well as individual default probabilities. Tied to the second issue is that SSA economies are fast immersing into the global financial connectivity, with portfolio inflows observed, and so questions are emerging as to whether this development(s) lend stability and growth benefits to SSA. Establishing whether financial stability is significant for growth is therefore one of the core concerns of this study.

1.2. Background

The centrality of financial deepening on economic growth was until very recently a foregone consensus. The pivotal work of Goldsmith (1969), McKinnon (1973) and others stimulated a paradigm shift in the way economies are organized; significant advancement in integration and liberalization of financial markets has been witnessed over the last three decades. Under the theory of efficient markets, the financial system has seen unprecedented deregulation and global liberalization. This also brought forth new challenges of financial stability as banks and financial service providers are faced with risks regarding excess leverage, inadequate liquidity and too little capital, thus exposing economies in developed, emerging and developing countries to volatility associated with risk exposures in banks' asset portfolios, as witnessed in the 2008/2009 global financial crisis.

The presumption of the necessity of financial development for growth is as valid for developed and emerging economies, as it is developing economies such as Africa. Despite the increasing depth of finance, Africa's economic growth has hitherto been regarded as wanting.

Some commentators described it as a tragedy[2]. Nevertheless, there is evidence that SSA has seen sustained growth since the mid-1990s with an annual GDP growth averaging 5.4% at the moment (Mlachila, Gil Park, and Yabara 2013). Notable instrumental factors include enhanced macroeconomic policies, resource discoveries, trade and regulatory reforms and public sector reforms.

On the financial development position, despite considerable financial sector reforms in most countries in the last two decades, the financial sector of most of SSA countries remains hugely underdeveloped compared to other developing regions (Senbet and Otchere, 2006). However, since 2007, SSA economies have over the recent years seen remarkable advancement in financial development including the use of mobile phone and agency banking (Mlachila, Gil Park, and Yabara 2013). Yabara notes that recent advancement such as expansion of mobile phone-based banking and the spread of pan- African banking groups hold the potential to fundamentally positively alter the banking landscape in much of SSA, but also portend new challenges for regulators . With the ever present pressure to assimilate into the world economy, the agenda of financial integration remains superior.

Nonetheless, some restraint conclusions include those of McKinnon (1973) and Levine (2004) who warn that finance growth nexus cannot be safely ignored without constraining our understanding of economic growth. More recently, Rousseau and Wachtel (2005, 2011) and others have empirically shown for a broad sample of countries, that the beneficial effect of a deep financial system (evidentially robust during the 1970s and 80s) seem to have waned into insignificance in succeeding decades.

[2] See for example Easterly and Levine, 1997

Why then is this the case? The empirical questions that arise are as follows: Could it be that the centrality of finance has shifted from being a servant of the real economy to being a master?[3] Would this finding replicate itself in newer data and for frontier economies of SSA [as a region that is attracting a lot of investor interest?], Does financial depth and financial stability matter for the real sector? This study contributes to empirical methodology of the finance growth nexus in two ways. The estimations reported are preceded by developing two models; the first is the investment model that attempts to establish interplay between financial depth and financial stability in the real sector. The second is the growth model with financial deepening-investment variable as the interacting term that determines the significance of causality between financial depth and per capita growth and the centrality of investment in facilitating the role of finance on growth.

The empirical analysis then proceeds as follows. First, the possible downside risk of financial liberalization and its impact on growth has so far been treated separately in finance-growth literature (Rousseau and Wachtel 2011). Taken together, the growing capitalization of frontier economies, and the potential ripple effects in the event of a financial crisis, warrants consideration in respect to the role of stability of its financial institutions and financial system in supporting the real sector. Hence, I estimate the investment model with financial depth and financial stability as explanatory variables with a view to unearthing the significance, or lack thereof, of the relationship between investment, financial depth, and financial stability. Second, I augment the growth model introduced in Barro (1991) and extended in King and Levine (1993), to include investment in the real sector as an interacting term for financial deepening.

[3] In other words, has finance shifted from serving priority sectors such as agricultural firms, selected manufacturing sectors for industrial drive into short term, high return equity sectors? According to Abiad A., et al, (2007) this was or is still a requirement in certain countries.

In this paper I purse the idea that investment in real sector is the most consequential channel through which real per capita GDP growth can be achieved. In addition the paper attempts to answer the role of financial stability channel in SSA in promoting investment and growth. It also investigates the now empirically prevalent question of causality between financial deepening and growth with a focus on frontier economies of SSA.

When introduced individually into the growth regression, the results do not support the narrative that a deepening financial system confers growth benefits. This interpretation changes when financial depth is interacted with investment in the real sector in the same specification; the coefficient of the interacting term (investment channel) is positive and most significant when compared with the individual effect of financial stability (in the investment model) where in fact, the coefficient is negative and significant at 1% (specification (1) – (3). The plausible explanations for the negative coefficient of financial stability are detailed in chapter five. On the same specification, exchange rate remains positively significant at 1% and robust to alternative specifications, thus, suggestive of a positive role of stable exchange rates in enhancing real sector activity.

Similarly, in the investment model, the coefficient of financial depth is negative but not significant. Introducing a one year lag of investment does not change the individual effects of financial depth. Hence we cannot infer causality between financial depth and investment. However, when financial depth is interacted with financial stability, the coefficient of the interacting term is significant and positive at 5% for both lagged specification and when year dummy is introduced.

The exchange rate coefficient is positive and significant at 1% all through alternative model estimations and when investment is lagged at *t-1*. There are good grounds for this inference. First, given empirical evidence supporting the interaction of financial deepening and investment on growth, it follows that exchange rates are not too cyclical and this tends to support the activity on the financial markets. Thus, it also follows that implications on the real activity is a logical consequence of changes in financial activity occasioned by exchange rate stability.

Introducing year dummies (2001-2011) in the growth regression reports a stable growth trend throughout the period of focus. According to the F-test for year dummy, the global financial meltdown of 2008-2010 did not lead to any notable GDP losses in frontier economies. The hypothesis that financial deepening confers growth benefits via real sector investment is affirmed when adjusted margins prediction is conducted. The prediction shows a leftward tilting of the slope of GDP when financial resources are channeled to different combinations of real sector investment and alternative levels of financial deepening.

The rest of the paper proceeds as follows. Chapter one, Section 1.3 contextualizes the frontier economy in the hope that such an effort would justify selection of the sample. Section 1.4 lists the research questions and objectives; section 1.5 presents the research hypotheses; section 1.6 discusses the statement of the problem, and section 1.7 justifies the study.

Chapter two reviews theoretical and empirical literature on finance-growth literature, chapter three describes the data and variables used in the study, and chapter four discusses the empirical methodology. Chapter five reports the empirical results and policy implications, limitations of the study, as well as concludes with the author's latitude of issues for further research.

1.3. Definitional and Salient Issues for the Sample

The "Frontier Economy", and Why it Matters

Understandably, a functional definition of a *frontier economy*[4] is debatable, and in fact, continues to evolve. As such, one can find differential indices that attempt to offer plausible conceptualizations of a "frontier market"[5]. Arguably, frontier markets have lower market capitalization and liquidity than the more developed emerging markets (EM) (Financial Times Stock Exchange (FTSE), 2014; (Morgan Stanley Capital International (MSCI), 2014). Fundamentally, there are five major index providers that offer a working definition of frontier markets. These are FTSE, MSCI, Dow and Jones, Standard and Poor's (S&P 500), and Russell.

In table 1, I exemplify the criteria for qualifying as a frontier market using the MSCI index. To put this into context, the size and liquidity measure for frontier markets is such that a country must have two publicly traded companies that meet three criteria, (i) the company's total market capitalization must be at least $630mm, (ii) float-adjusted security market capitalization must reach $49mm and (iii) the liquidity of the security must be at least 2.5% of annualized traded value ratio (ATVR)[6] (MSCI, 2014). Other requirements include the need for some level of

[4] The term frontier economy or Frontier Market used in this paper follows the definitions in FTSE, MSCI, S&P-500, Dow and Jones and Rusell indexes

[5] The study banks on this plausibility for the reason that major index providers regularly communicate their criteria for determining market definitions.

[6] This is a measure of liquidity that MSCI uses and is calculated using median monthly traded values of security and the company's market capitalization adjusted for float. The ATVR requirements for EM and Emerging Markets and Frontier Economies (EAFE) are 15% and 20& respectively.

openness to foreign ownership, at least a partial ease of capital movements and "modest" degrees of operational efficiencies and institutional sobriety.[7]

Why does the region matter? First, in "The New Frontier; Economies on the Rise", IMF economy Forum of 9th May 2014, Min Zhu, correctly note that there is a group of fast-growing low-income countries that are attracting international investor interest—the frontier economies. *The Economist* elucidates this development when on April 5th 2014; it noted that "money is leaving emerging markets for riskier bet at the investment frontier" (*The Economist, 2014)*. The last decade has indeed seen a rise in investor appetite and therefore capital inflows. Granted, these capital flows serve to strengthen the financial landscape in SSA. It would therefore be of interest to empirically establish whether, how, and to what extent this development impacts growth of the frontier markets. However, for lack of adequate data on portfolio inflows (including equity and debt securities), this paper focuses a relatively narrower sense of financial depth (market capitalization, credit to private sector and liquid liabilities).

Second, the researcher is of the view that understanding what constitutes frontier economies will help in two ways. The first is that it justifies the need not to focus the study in the broader context of SSA economies, largely due to potential bias of lamping together countries in different levels of financial deepening and existential asymmetries in macroeconomic performance. The second reason hinges on the fact that these countries' economies offer immense opportunities laden with huge risks, particularly in the bond and equity markets, both for the investors and SSA economic and financial systems.

[7] For details on definitional considerations of frontier markets, see among others, Atwill, T., (2014), "Frontier Markets: Concentrated and Misunderstood" and MSCI (2014).

Table 1: MSCI's Equity Market Indexes

Index	Number of securities	Market Capitalization ($tn)	Percentage of ACWI[8]+ FM
MSCI EAFE	910	12.5	33.7
MSCI Emerging Markets	834	3.8	10.3
MSCI Frontier	128	0.1	0.3
MSCI ACWI+ MSCI Frontier Markets	2528	37.0	100.0

Source: Adapted from MSCI (December 31st 2014); Parametric (2014)

For the reasons highlighted, I shall therefore focus on all the nine countries of SSA that appear on the various classifications of the five major index providers. In table 2 below, I construct a matrix of 9 SSA frontier economies based on specific indexes and period[9].

[8] A market Capitalization Weighted Index
[9] These are Botswana, Cote d"Ivoire, Kenya, Namibia, Nigeria, Ghana, Zambia, Gabon and Tanzania

Table 2: Classification of Frontier Economies (Various Indexes)

Source of definition	Data valid as at	Countries
Financial Times Stock Exchange (FTSE)	2014	Botswana, Cote d'ivoire, Kenya, Nigeria,
Morgan Stanley Capital Index (MSCI)	2013	Kenya, Nigeria, [Botswana, Ghana were in consideration]
Standard and Poor's (S&P 500)	2011	Botswana, Cote d'ivoire, Ghana, Kenya, Namibia, Nigeria, Zambia
Dow Jones	2011	Kenya, Nigeria,
Russell	2013	Botswana, Kenya, Namibia, Ghana, Nigeria, Tanzania, Zambia

Source: Author's construction based on various classifications

1.4. Research Questions and Objectives

In this paper, my main aim is [not] to re-visit the causal relationship between financial depth and growth. This is a relatively well established fact in theory and empiricism. Rather, is to focus on the channels through which financial deepening impact economic growth of a sample of 9 frontier economies in SSA. As such, the specific objectives are three (i), to determine and assess the most significant channel(s) through which the deepening financial system impact growth in frontier economies of SSA, (ii) to establish the relationship between financial depth, financial stability and economic growth in frontier economies of SSA, and (iii) to draw policy implications on the finance-investment and growth nexus in frontier economies of SSA. In so doing, the empirical questions that I pose include, (i) What is the most significant channel(s) through which financial deepening impact growth in frontier economies of SSA? (ii) Does financial stability (or instability) matter for economic growth in SSA frontier markets? And (iii),

what policy relevance can we infer from the empirical results of the financial deepening-real investment, financial stability and growth relationship in frontier economies of SSA?

1.5. Research Hypotheses

The empirical questions raised will follow my tentative arguments in two key premises. First, I postulate that investment in real economy is the most significant channel through which financial deepening impact growth in frontier economies of SSA, otherwise, the null hypothesis is not rejected. In the second hypothesis, I argue that financial depth and financial stability do matter for investment and growth in SSA frontier economies.

1.6. Statement of the Problem

Despite increased financial sector reforms in SSA over the last two decades, existing evidence on the mechanism by which financial deepening impact aggregate growth in SSA is weak. In addition, the importance of financial depth and financial stability in SSA is not clearly understood in evidence. These are critical questions that remain weakly understood in the financial deepening and growth debate. This study seeks to revisit the debate by aiming at the questions regarding (i) whether financial deepening matters for growth focusing on the frontier economies of SSA, (ii) whether investment in real sector is the most significant channel that impact growth in SSA's frontier markets and (iii) the extent to which financial depth and financial stability is important for growth.

To illustrate the extant problem of finance-growth controversy, I site a few examples. Broadly speaking, In *Economic Growth and Financial Depth: Is the Relationship Already*

Extinct? Rousseau and Watchel (2005) inject renewed pessimism into the finance-growth discourse; they question the strength of the relationship between finance and growth particular for the last two decades preceding their study. The authors are emphatic that only in poorer countries is a positive relationship reported, albeit with imprecise measurements. More recent studies such as Stephen G. Cecchetti and Enisse Kharroubi (2012), and others also paint doubt on the effects of finance on growth; In their study, *Reassessing the Impact of Finance on Growth,* Stephen and Enisse conclude that although finance is necessary for growth, that necessity decouples after a certain point, hence, "more finance is definitely not always better" (p. 14)[10].

1.7. Justification

The essential contribution of this paper is brought out in three main ways; first, it combines empirical and financial stability literature to give a new impulse to the finance-growth nexus. Second, it offers new analytical mileage through augmenting standard finance-growth models introduced in Barro (1991) and extended in King and Levine (1993) by interacting financial stability and investment with financial depth in the investment and growth models. Third, this paper is the first attempt [known to the author] to generate an understanding of finance-investment-growth nexus for a focused sample of frontier economies in SSA.

In SSA's growth agenda, the prominence of the now highly liberalized sector – which has seen innovative finance, including the development of mobile phone banking in countries such as Kenya – is essentially spoken of in anecdotal evidence and is not clear in empiricism.

[10] In this paper, Stephen and Enisse investigate how financial development impact aggregate productivity growth, based on a sample of developing and emerging economies. They make two conclusions. First, financial deepening is only good up to a certain threshold, after which it becomes a "drag" on the economy. Second, the results of advanced economies indicate that a fast growing financial sector is injurious to aggregate productivity growth.

Furthermore, most panel data studies focus on relatively heterogeneous (financially speaking) sample of countries, hence increasing the possibility of biased estimates. This paper offers a combined approach that analyses financial deepening-growth link through a two-model methodology[11] on a focused sample of frontier economies of SSA. I introduce the financial stability into the investment regression to test the significance of financial stability in enhancing activity in the real economy.

[11] The two models comprise; (1) the investment model and (ii) the growth model with financial deepening-investment as the interacting term. Refer to methodology section for detailed description.

CHAPTER TWO

2.0. LITERATURE REVIEW

This section briefly reviews the main array of global and regional literature upon which I build my empirical models. I present the section in two sub-parts, (i) the theoretical underpinnings regarding finance, financial stability and growth, and (ii), the empirical works relating to them. In theory as in empiricism, finance-growth studies fall into three categories; those who argue that financial deepening cause growth, those who hold that growth causes financial deepening, and those whose notion is that the two reinforce each other.

2.1. Theoretical Methodology

Supply siders like Schumpeter (1911) was one of the early economists to argue that credit supply created by the banking sector facilitated economic growth in the years of industrialization. Gurley and Shaw (1955), Hicks (1969), and Goldsmith (1969) quoted in Haiss, Juvan, Mahlberg (2011: 5) postulated that "underdeveloped financial system impedes real economic growth". The pivotal work of Goldsmith (1969), McKinnon (1973) and Shaw (1973), and others inspired a model swing in the way markets are structured; significant advancement in integration and liberalization of financial markets has been observed over the last three decades. McKinnon and Shaw identified that with too much activism in the financial system, efficient capital (savings) allocation paid the ultimate price. Excessive interference in the financial system, they claim, is in the form of artificially low interest rates which discouraged savings and decreased the amount of investable funds, and the remaining funds were not efficiently allocated (Haiss, Juvan, Mahlberg 2011: 5). Many scholars argue that their works were formative for the general reception of the

financial liberalization doctrine which set the stage for empirical work in this field (Wachtel 2003); Ang, (2008).

Literature has identified alternative views of the relationship between finance and growth. Particularly, Robinson (1952) holds the view that finance is demand-following rather than leading economic growth. Robinson (1952), (quoted in Levine 2004:1), argued that "where enterprise leads, finance follows". In other words finance responds to changing demands in the real economy. This leads to the development of "new financial institutions, services and products" (Ang, 2008: 540). Further divisions on the notion of finance-growth spectrum can be given insightful interpretations from Merton Miller (1988) who argues that the [idea] that financial markets contribute to economic growth is a proposition too obvious to deserve serious discussion.

Robert Lucas (1988) shrugs off finance as an overstressed determinant of growth. In his study, *On the Mechanism of Economic Growth*, Lucas argues: *"*...in general, I believe that the importance of financial matters is badly over-stressed in popular and even professional discussion" (p.6). Rather, he contends that technological progress is the relevant factor; finance can play an important role in growth by routing incentives into research and innovation via the "efficiency channel" (Haiss, Juvan, Mahlberg 2011:7); Thiel 2001: 6). This postulate is however restricted by the presumption of absence of frictions in the market (Modigliani and Miller 1958).

Haiss, Juvan, and Mahlberg (2011: 6) points out that in light of the failing development policies of the 1980s, "neo-structuralists" economists assessed that efficiency enhancing rhetoric of financial liberalization was overrated and that liberalization was unsuccessful in producing desired results. Buffie (1984) reinforces the neo-structuralists notion of the failed objectives of

financial liberalization. He criticized the enforced liberalization of the financial markets of developing economies and called it a "perilous undertaking", partly because of the neglect of the "curb markets"[12] in McKinnon and Shaw framework (Buffie, 1984:320). He notes that in practice, curb markets are important in the transmission process between finance and the real sector.

In the 1990s, the McKinnon/Shaw framework was augmented to include financial intermediation and produced further evidence to support positive effect of finance on growth (Haiss, Juvan, Mahlberg (2011). This was designed to overcome extant inefficiency and information frictions in the financial sectors of developing economies by "lifting domestic government restrictions and financial liberalization (Ang 2008: 542).

In light of the theoretical summaries provided in the preceding section, the next section presents some empirical findings of the finance-growth and financial stability nexus.

[12] The cub market is an informal (sometime illegal) credit market where loans are transacted "freely at uncontrolled interest rates" (Buffie 1984:306).

2.2. Empirical Approaches

General Overview from Around the Globe

Empirical techniques that have been used to analyze the finance-growth relationship include simple time series regressions to more sophisticated dynamic panel approaches (Haiss, Juvan, Mahlberg (2011). Due to data [un]availability, most estimation techniques have focused mainly on macroeconomic variables. However, there is growing interest in disaggregated data analysis (e.g Rajan and Zingales 1998) Wachtel (2003:44). Most studies have also expanded to different financial markets and transmission channels using a diversity of financial development indicators (Temple, 1999). Additionally, institutional variables are drawing interest form researchers such as Fischer and Sahay (2000). Ang (2008) notes that the weakness in these approaches is finding appropriate proxies for the factors of interest.

Despite the belief in the imperative of a deepening financial market and economic integration in growth, neither specific country nor cross-country analyses have reached an unambiguous support of this hypothesis.

The pivotal effort of the finance-growth nexus is provided in King and Levine (1993). The authors extend the cross country model pioneered in Barro (1991) to embrace financial variables[13] to the growth regression[14]. The study found not only a robust but also significant connection between preliminary financial conditions and ensuing growth in GDP per capita. In addition to this finding, Levine's 2004 work, *Finance and Growth: Theory and Practice*, makes

[13] Such as Claims on private sector as percentage of GDP and liquid liabilities.
[14] Barro (1991) used a cross section of 98 countries form 1960-1985, King and Levine (1993) augmented the model with 80 countries for the period 1960 to 1989.

an attempt to answer whether financial intermediation and markets matter for growth. His study concludes that the two elements of finance are significant for growth.

The main channels through which finance affects growth, is summed up in Levine (2005). They include; generating information, channeling capital to productive activity, monitoring investments, facilitating trade, mobilizing savings and managing risks. Nonetheless, Ratna et.al (2015) notes that the variables used in the study (such as ratio of private credit to GDP and market capitalization "are rough proxies that do not necessarily capture how well finance accomplishes these functions" (pg. 8). They therefore warn that there is need to infer the results with caution. Recent literature contributing on the impact of finance on growth also exhibits differential results across countries, regions and income levels. Examples include the works of Nili and Rastad (2007), and Barajas, Chami and Yousefi (2013).

Rousseau, and Watchel, (2005; 2011) represents an emerging pessimism of the finance-growth nexus. Using rolling regression technique to observe which countries provide a robust support for the finance-growth relationship, they find that overall, the nexus between finance and growth has dissipated overtime and is much weaker in the years from 1990 - 2005 than it is in earlier data covering 1960-1989. Specifically, they draw two critical conclusions; the first is that the relationship is positive in poorer countries. The second, is that the relationship between finance and growth is absent in rich countries.[15] This seems to suggest that the more financially deep a country becomes, the less will be its influence on growth. In addition, Rousseau, and Watchel, (2011) also note that increased incidence of banking crisis also contribute to the fading of the evidential connection between finance and growth.

[15] A useful discussion on dissipating finance-growth relationship and possible explanations for the same is found in Rousseau, P., Watchel, P., (2005),

Other studies that cast doubt on the long term role of finance for growth include Berkes and Panizza (2012) who show that there is a threshold beyond which excessive financial depth negatively affect growth. Their finding is validated by empirical analysis of Ratna et.al (2015) who finds a "significant bell-shaped relationship between financial development and growth" (p. 15). Further evidence is found in Aizenman et al. (2015) who conduct a study in 41 economies using sectoral level data; they arrive at a similar conclusion; that financial development increases growth but only up to a certain point when it dissipates.

2.3. Financial Instability and Growth Volatility: Some Contextual Empirical Literature

Up to the mid-1990s, empirical studies reported robust and significant positive connection between financial deepening and growth. However, there is an emergence of findings that can be accorded insightful interpretations in respect of financial depth, financial stability and growth debate. King and Levine (1993) find a weak link between finance and growth. Rousseau and Wachtel (2011) tested the robustness of King and Levine's panel estimation results and finds that the significance of the finance coefficients fades away in the first half of 1990 (Haiss, Juvan, Mahlberg 2011).

Nevertheless, the most notable finding that supports the notion of stabilizing the effect of finance is that of Bernanke, Gertler and Gilchrist (1999) who hold the view that financial depth lessens volatility by reducing financial frictions such as information asymmetries, absorbs shocks, promotes risk sharing, and smoothens consumption.

However, the dissipating effect of finance-growth relationship is increasingly attracting attention. Haiss, Juvan, Mahlberg (2011) for example asks "how can this dramatic change in the

relationship that formerly seemed so robust be explained? The authors find a plausible answer in Rousseau and Wachtel (2011) who attempts to unpack the question. An important empirical conclusion emerges from Rousseau and Wachtel's investigation; the vanishing effect of the financial sector on growth is highly related to financial instability (crisis). Further, the authors claim, albeit anecdotally, that policy induced financial liberalization significantly altered the finance-growth arrangement. In other, words impulsive liberalization may display negative indirect effect on real growth by prompting financial crises. Demirgüç-Kunt and Detragiache (1998), Kaminsky and Reinhart (1999) and Barell, Hurst and Kirby (2008) also contend with the notion that liberalization (such as excessive credit growth) is a good barometer for financial instability.

Demirgüç-Kunt and Detragiache (1998) empirically tested the empirically link between banking crisis and financial liberalization for the period 1980-1995 and found that the ensuing liberalization was associated with banking crisis for both industrial and developing countries. Haiss, Juvan, Mahlberg (2011: 16) note that although the findings of Demirgüç-Kunt and Detragiache indicate that liberalization in the absence of strong institutional, macroeconomic and legal environment is likely to have destabilizing effects on the financial sector, it remains "puzzling why financial collapses happen to recur on a regular basis and why no economy despite its institutional strength seem to be immune against it" (p. 16). This casts doubt on the explanatory power of institutional proxies.

Analogous to the above literature, the recent crises (notably 1997 Asian crisis and 2008/2009 global financial crisis) point to the failing power of institutional sobriety in explaining financial stability and growth relationship. Further, studies now pay attention to the sources of

financial instability. Macro prudential regulations do not seem to head off risks and excessive exuberance in the market. For example excessive risk lending disguised by complex financial products is highly related to financial crisis as Barrell, Hurst and Kirby (2008) correctly predicted for the U.S in their concluding remarks. Notable contributions that expose a similar pattern of thought include Minsky (2008)[16], Shiller (2003, 2008) and Rajan (2006); that underestimation of risk and the apparent pro-cyclicality of the system transpose risks into the real sector possibly hurting growth.

On the same note, Rajan (2006) (quoted in Crotty, (2009) identifies three main drivers of the new financial architecture in the financial system; technical change, deregulation and institutional change. The changes have broadened the size of market participant base and replaced the conventional banking business model, creating "arms-length transactions".[17]Institutional change and deregulation fuels new institutions such as hedge funds, equity firms, and venture capital and insurance funds which through "financial democracy"[18] exposes itself to considerable risk (Rajan 2006).

By the same token, IMF (2008), points to the replacement of the traditional banking model by the *originate to distribute model*, where banks can sell claims off their balance sheets through securitization while accessing funds on the money market without security matching. This increases bank leverage and exposes the system to crisis through credit booms that ultimately go wrong. The vulnerability of this increased leverage more always than not, cause

[16] Minsky argues that unsustainable debt levels ("Ponzi Finance"), reaches a point in time when it triggers immediate down-spiral of deleveraging and liquidity freeze. For more on Minsky's "Ponzi Finance", see Minsky (2008).

[17] "Technical change refers to application of new communication technologies as well as well as pervasive commercial use of complex mathematical models fueling financial innovation" Shiller (2008): 117-121)

[18] Shiller (2008) refers to financial democracy as the spreading of financial innovation to more and more people.

contagion sufficient to lead to GDP contractions in most emerging economies and even in developing countries, SSA notwithstanding

2.4. Sub- Saharan African in Context

As noted in chapter 1, economic development in SSA has been constrained by a lack of well-developed financial markets. Nevertheless, the region has experienced strengthening macroeconomic performance that has seen it become more resilient in the recent financial crisis and boosted foreign investor optimism about the private sector of SSA[19]. This factor, coupled with changing structure of financial flows from North-South to South-South and the increasing financial integration has enhanced cross-border capital flows[20]. In this sense, the increasing financial depth raises questions on its impact on economic growth and stability. As such, the subject is becoming topical for empirical researchers and some examples are given below.

Gries, T., Kraft, M., and Meierrieks, D., (2009) tested for causality between financial deepening, trade openness and economic development for 16 sub-Saharan Africa countries using Hisiao-Granger approach and found "limited support for the popular hypothesis of the finance led growth" (pg. 1860). They conclude that the financial and trade sector policies have not benefited the investigated countries and therefore "cannot be supported".

In *Financial Deepening and Economic Growth in Nigeria, 1986-2011: An Empirical Investigation*, Ohwofasa and Aiyedogbon (2013), use impulse response function and variance decomposition to investigate the finance-growth connection in Nigeria. They find a long run

[19] See chart figure (3), chart (1) and (2) in appendix section for macroeconomic performance of SSA

[20] This development has been partly motivated by spread of pan-African banking groups, regional integration efforts such as East African Community (EAC), increases in capital requirements and liberalization of entry rules in host countries Christensen, (2014), BIS Working Paper No. 76.

positive relationship between the variables of financial deepening and growth notwithstanding the fact that the level of financial development remains relatively low in spite of many reforms in the sector.

Adopting co-integration and error- correction models, Odhiambo (2010) examines the relationship between interest rate deregulation, bank-based financial development and economic growth in South Africa, using financial development and growth models. In the finance growth model, Odhiambo employs investment as an intermittent variable between growth and finance to establish their causal link. On the role of interest deregulation rates in financial development, the study finds strong evidence in favour of interest rate reforms in South Africa. However, the results of the second model (growth model with investment as mediator variable) contradict previous studies; financial development resulting from interest rate reforms "does not Granger cause investment and economic growth" (p. 131). He concludes that the causal relationship between financial development and economic growth tend to assume a demand following path, and that given the causal flow from investment to financial growth, it is likely that growth in South Africa is achieved through investment in the real sector rather than through financial development. In a similar study for Tanzania, Odhiambo used foreign capital inflows as an intermittent variable to report a unidirectional causal flow from economic growth to financial depth (Odhiambo, 2011).

Chapter Conclusion

The review of literature, both theory and empirical, advertises one critical weakness in the understanding of the finance-growth nexus; there exist an imprecise link between financial development and growth. Empirical works do not present a precise media through which

financial deepening influences growth, especially in sub-Saharan Africa. Specifically, there is no study, known to the author that focuses on frontier economies of SSA as relates to the financial depth-investment channel and growth. Furthermore, no study embraces the financial stability aspect of the system in understanding the finance-growth relationship of frontier economies of SSA. Nevertheless, few studies in SSA such as Odhiambo (2007), offer a good beginning, shading light on the importance of investment as a channel in which financial depth can impact on growth. In this respect, there is need to explore the extent to which real sector investment is critical for growth for a focused sample of SSA frontier economies.

CHAPTER THREE

3.0. DATA AND VARIABLE DESCRIPTION

The essential focus of this paper is the centrality of investment in the financial deepening-growth relations as well as the role that financial stability plays in investment and in growth. In the growth model, fixed capital formation is introduced as a mediator term that interacts with financial deepening in the growth regression. The growth regression also embraces government debt (% of GDP), openness to trade, long term public sector debt and democratic score (polity2). These additional controls will help in reducing omitted variable bias. The investment model controls for human capital, and a set of other control variables including control of corruption and exchange rate.

3.1. Data: Sources and Coverage

The study uses a panel dataset[21] o*f* 8 frontier economies of SSA selected using five[22] sources of market capitalization index for 12 years (2001-2011). Among the many variables, this data set included time-series of GDP per capita, share of gross fixed capital formation and government external debt. The national accounting data set are measured in constant United States dollars. The country sample size is assumed to be relatively homogenous, at least in respect of the financial deepening characteristics, under the available criteria[23]. By focusing the sample to the narrower SSA frontier markets, I follow Watchel (2011) and Haiss, Juvan and Mahlberg (2011) in analyzing countries with shared growth characteristics, [financial] dynamics, and institutional symmetries [24].

3.2. Key Variable Definitions[25]

Financial Deepening (Fin_Dep)

The theoretical presumption employed in this study relies on the belief that a deepening financial system is instrumental to per capita growth, conditional on investment in the real sector. The financial deepening employed here follows the financial intermediation variables employed in Haiss, Juvan and Mahlberg (2011) which include *private sector credit* (% of GDP) and m*arket capitalization* as well as liquid liabilities (from GFDD). The expected sign of financial

[21] The data set are obtained from International Monetary Fund (IMF), International Financial Statistics (IFS), World Governance Index (WCI), Global Financial Development Database (GFDD) and World Bank.
[22] These are FTSE, MSCI, S&P 500, Dow Jones and Russel.
[23] See table 2 and section 1.2 for list and definitional criteria of frontier markets
[24] However, caution should be exercised in generalizing the results as individual countries have other differentials such as varying level of macroeconomic performance.
[25] The variables defined here are not exhaustive. See definition of other control variables in table 3.

deepening coefficient on growth is positive when interacted with investment and with financial stability[26]. Financial depth variable is denoted by *Fin_Dep*.

[26] The study hypothesizes that conditioning the financial deepening variable on the investment in real sector variable produces a positive coefficient on growth by redressing the imbalance between inadequate economic risk-taking [that supports growth], and excessive financial speculative risk-taking that has incipient pressure to create booms and bursts (instability). This instability causes the economy to oscillate on a stagnant mode over the longer term.

Financial Stability (*Fin_Stability*)

The rationale of including financial stability measure in the finance-growth regression stems from the assumption that a stable financial system has inherent capability to allocate capital more efficiently, assess and manage risks and remove asset price bubbles that disrupt the real and financial sector. In other words, any shocks and imbalances [both endogenous and otherwise] will be dissipated by a self-correcting mechanism of the financial system. In addition, we can safely assume that bank runs, stock market crashes and hyperinflation concomitant with shocks and imbalances is a logical consequence of an unstable financial system, and this can be tested empirically if we allow for appropriate stability measure to be regressed against investment in real sector in an interaction with financial depth.

There are a number of measures that can be used to represent financial stability. These include firm-level stability measures such as Bank *z-score*, *Merton's model* and *Distanc-to-Default* (DD) and systemic stability measures,[27] such as *First-to-Default probability (FTD)*, S*ystemic Expected Shortfall* (SES), SRISK (an extension of SES), *regulatory capital*, and *credit growth*. In this paper, I adopt bank *z-score.* This measure captures the probability of default of a country's commercial banking system (Global Financial Development Database (GFDD), 2013). *Z-score* compares the buffer of a country's commercial banking system (capitalization and returns) with the volatility of those returns[28]. The higher the z-score, the lower is the probability of insolvency.

Exchange rate (Ex_Rate_F)

[27]In this case, some studies attempt to aggregate firm level measures (z-score and DD) by weighting each measure against a firm's relative size. However, the aggregated measure does not consider possible financial contagion.
[28] Other studies that have uses z-score include Ratna Sahay et al (2015), Cihah and Hesse (2010), and leaven and Levine (2009). The weakness with z-score noted in GFDD (2013) is that it relies on accounting data and as such is as good as the accounting and auditing framework in place.

Exchange rate stability has received a lot of attention since the collapse of the Breton Woods system in the 1970s. Experience has shown that enormous oscillations in exchange rates of major currencies can be disastrous, not only for the countries directly involved but also for the rest of the world) Coeuri, B., and Pisani, F., 1999). Notable events occasioned by fluctuations in currency exchange rates against the dollar include the 1997 Asian financial crisis and the introduction of the Euro in 1999. Due to business-cycle motivation, I use Hodrick and Prescott (1997) time series filter to de-trend the exchange rate. The expected sign of exchange rate denoted by ***Ex_Rate_F*** is negative since large misalignments hurt the financial sector, and hence growth prospects, particularly for SSA countries.

Investment (Inv)

I employ gross fixed capital formation (% of GDP) denoted by ***Inv*** as a proxy for investment in the real sector along the definition in World Bank's Global Development Indicators, (World Bank, 2015). The term encompasses land improvements, equipment, plant, and machinery acquisitions and construction[29]and is a barometer for real activity in the economy. The interaction between investment and financial depth is expected to explain the direction of causality between financial development and per capita growth.

Human Capital (H_Cap)

Some economists like Barro, (1991) and Barro and Lee, (1993) utilized school enrolment rate as a proxy for human capital. This is known to have a drawback in the sense that a student's

[29] As defined by World Bank (2015), and identified by Ravazzolo, F., and Vespignani, J.L., (2015), in their paper, *A new monthly indicator of Global Real Economic Activity"* Includes, the construction of roads, rails, hospitals, schools, offices, real estate, buildings, tunnels, security; transport for example automobile, airline parts; energy for example pipelines electricity; packaging for example food and beverage containers, chemical containers; home goods appliances for example fridges electronics; and agriculture for example farm machinery. Net purchases of valuables are also considered capital accumulation. It is a commonly used proxy among researchers in economics and finance.

effectiveness is seen after participating in productive activity. Currently, human capital is conceptualized based on OECD measures which include investment in human capital, quality adjustments and results on education (Hansson 2008). This paper employs an index of human capital per person (denoted by ***H_Cap***, based on years of schooling Barro and Lee, (2012) and returns to education (Psacharopoulos, 1994). This measure has the advantage over *initial secondary school enrolment* proxy for human capital because it alleviates the potential bias effects of omitting *returns to education*. The expected sign of the coefficient of human capital is positive.

Public Debt (Debt_ExLT)

Public debt as a percent of GDP (denoted as ***DebtEx_LT*)** has both implications for the financial sector and for the real economy. The twin dilemma of SSA frontier economies is that the region is becoming increasingly indebted while at the same time facing ensuing capital flight. There seems to be a plausible correlation between the increasing indebtedness and capital flight. To illustrate this, it is instructive to mention Ndikumana and Boyce (2011), whose work *Capital Flight from sub-Saharan Africa: Linkages with External Borrowing and Policy Options,* confirms that the continent's private external assets between 1970 and 2004 exceeded its public external liabilities by over $248 billion. This spurs a debt overhang effect as more debt stock lead to additional capital flight. The expected sign for external debt coefficient is, negative.

Political Stability (Democratic Score- Polity2)

Political stability (***Polity2*)** represents a very important component of the development of any financial sector, particularly in developing countries characterized by political capture.

Theoretically, investors' appetite is influenced by the existing political conditions and is expected to be low in unstable and less democratic political environment, relatively speaking. In the growth and investment model, I adopt *Polity2* measure following Marshall and Jaggers (2010)[30]. An example of empirical work that used *Polity2* is that of Gathogo and Sohn (2015) in their paper *Infaltion Targeting in Developing Countries*. It is expected that the sign of the coefficient will be positive in the both investment and growth models.

The denotations and description of the variables are given in table (4) (in appendix). Their definitions and sources are included.

[30] Polity 2 measure the influence of democratic score on the financial deepening and finance-growth interaction

Openness to Trade (Open_T)

Trade is the sum of exports and imports of goods and services expressed in percentage of GDP [i.e. (X+M)/GDP)]. This measure is used to proxy for trade openness or the extent to which a country is exposed to international trade. According to Gathogo, A.G., and Sohn, Wook (2015), trade openness is an alternative way to assess the degree of exposure to external shocks because it has a direct relationship with exchange rates. They note that predetermined exchange rates make a country vulnerable to external shocks due to the pressure of sustaining such a regime. Similarly authors such Wacziarg and Welch (2003) have popularized the notion that liberalizing trade regimes have beneficial effect on growth. The expected sign of openness to trade is positive.

CHAPTER FOUR

4.0. ECONOMETRIC METHODOLOGY

4.1. Empirical Model

The objective of this paper is to determine the relationship between financial deepening, investment and growth and between financial stability and investment. N= 1…9, countries are observed for T = 1…12, time. Panel data estimation technique is thus a suitable approach. Hence in this section, I outline the empirical approach to the application of the panel growth regression in Barro (1991) and Levine (1993) in which I refine to include finance-investment and financial depth- financial stability interaction terms to investigate the multiplicative effect of two sets interacting terms on investment and economic growth. Two examples of empirical studies that employ interaction terms in estimating financial development and economic growth are Rajan and Zingales (1998) and Anghion et al. (2005).

Panel data estimation techniques are held to be advantageous in that they allow for time invariant characteristics to be incorporated into analysis of broad sample of countries (Wooldridge, 2013). Wooldridge argues that panel data is empirically helpful because they address omitted variable bias and unit unobserved heterogeneity (Wooldridge, 2013: 485-490). One can also use a lagged explanatory variable to alleviate measurement errors and reverse causality (Temple, 1999). Not all countries were active during the observation period; hence the resultant panel is unbalanced.

My approach proceeds in two key steps; first, I present the investment model in which I test the extent to which financial deepening affect real sector activity (the investment channel to

growth). In the investment regression, the dependent variable is the investment. The core explanatory variable is financial depth and the interacting term (financial depth and financial stability). A set of control variables including human capital, openness to trade, democracy, and regulatory quality are employed. In the same model, I introduce bank *z-score* measure of financial stability and interact it with financial depth to explain their combined effect on the real sector. I also run a second but similar set of specifications in which I introduce a one year lag of investment to address reverse causality. In the second step, I allow for an interaction effect of the two variables (financial depth and investment) in the growth regression and observe the relationship. In this case the dependent variable is the growth in GDP and the core independent variable is the finance-investment interacting term. Similarly, a set of control variables will be introduced and alternative model specifications run.

In estimating the growth regression, I assume that growth in the current is affected by growth in the previous year(s) hence I use a lagged independent variable GDP*t-1,* in alternative specification. Below are the model specifications that I use for the estimations.

4.1.1. The Investment Model

In a general form, the investment-financial depth regression with unobserved fixed effects for this study appears as follows:

$$\beta_1 Inv_{it}. = \beta_0 + \beta_1 Fin\_Dep_{it} + \beta_2 X_{it} + \mu_i + \varepsilon_{it} \ldots\ldots \; i=1\ldots N;\; t=1,\, 2\ldots T\ldots \ldots \quad (1)$$

Subscript *i,* denotes cross-section units (countries) (i= 1, 2…8), t stands for time in years, (t= 1, 2…11), i.e 2001-2011. *Inv,* is investment in real sector proxied by gross fixed capital formation, *Fin_Dep* is a measure of financial depth of cross-sectional unit *i,* at time *t, X_{it}* is a set

of control variables including public debt and exchange rate. $\mu_i$is the panel-fixed effect with the assumption that,$0 = \sum_{I=1}^{n} \mu_i$ and ε_{it} is the country heterogeneity, both of which are assumed to be independent and identically distributed (i.i.d), i.e.,$\mu_{it} \sim N(0, \delta_{\mu}^2)$ and$\varepsilon_{it} \sim N(0, \delta_{\varepsilon}^2)$ respectively.

Since it is not clear which specification of country-spesific effects in panel regression (random or fixed effects) yields better estimation, I conduct Hausman test. Under the null hypothesis, random effects would be preferred because it is more efficient (Wooldridge, 2013). However, the test I conducted rejected the null hypothesis at 1% and therefore I use fixed effects estimation in all the specifications. The results of the fixed effects estimations for the investment model are presented in tables (5) and (6).

4.1.2. The Growth Model

King and Levine (1993) version of Barro (1991) growth regression takes the general form:

$$Y_{it} = \beta_0 + \beta_1 F_{it} + \beta_2 X_{it} + \mu_i + \varepsilon_{it} \quad \text{..... (2)}$$

Where Y_{it} is defined as the growth rate in per capita GDP of cross section *i*, in time *t*, $\boldsymbol{F_{it}}$, denotes financial depth for country *i* at time *t,* $\boldsymbol{X_{it}}$ represents a set of control variables, μ_i is unobserved heterogeneity and ε_{it} is the idiosyncratic error which indicates unobserved factors that change over time and which affects Y_{it}. The assumptions under the investment model in equation (1) hold for equation (2) as well.

For this study, I augment King and Levine (1993) growth model (2) to include an interaction between financial depth and investment so that the new model becomes:

$$Y_{it} = \beta_0 + \beta_1 F_{it} + \beta_2 Fin\_Inv_{it} + \beta_3 X_{it} + \mu_i + \varepsilon_{it} \quad \text{..... (3)}$$

4.2. Empirical Estimation

The fixed effects model we employ relates to unbalanced panel data set as there are some missing observations for some of the cross sections. According to Woodridge (2013), if T_i is the number of time periods for cross sectional unit *i,* we simply use this T_i observations in conducting the time-demeaning. Since the data is for countries and not individuals or firms, we assume that the missing data is not correlated with the idiosyncratic error, and so we do not expect any problems with our estimation. One beauty with fixed effects estimation is that even though some sample selection problem may occur, it allows for attrition to be correlated with the μ_i; some units will be dropped out of the estimation which is captured by the unobserved effect.

4.2.1. Estimating the Investment Model

Two methods ordinarily compete for estimating unobserved effects; first differencing of the data (FD) and the other is time-demeaning the data [(fixed effects- (FE)]. Given that our sample has time period $T \geq 3$, the FE and FD estimators are not the same hence we use FE as this works under the assumption that ε_{it} are serially uncorrelated. In this regard, the FE yields more efficient estimator than FD, (Wooldridge, 2013 p. 490). Wooldridge notes that under strict exogeneity assumption, the fixed effects estimator is unbiased. Consequently, the investment model is estimated as follows.

$$Inv_{it} = \beta_i F_{it} + \beta_2 X_{it} + \mu_i + \varepsilon_{it} \ldots t= 1., 2\ldots\ldots T \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)^{31}$$

[31] Not that $\beta_2 \overline{X_1}$ also includes the interacting term between financial deepening and financial stability

Since the fixed effects estimator allows for random correlation between μ_i and the independent variable at time *t*, any independent variable that is fixed over time for all cross-section units is removed by the unobserved effects transformation (Wooldridge, 2013). As such, the unobserved effects μ_i, appearing in both equations (4) and (5) is eliminated in the unobserved effects transformation. i.e. in equation (6). Averaging equation (4) over time yields equation (5) below.

$$\overline{Inv_i} = \overline{F_i}\beta_1 + \cdots + \beta_2\overline{X_i} + \overline{\mu_i} + \overline{\varepsilon_i} \quad \ldots\ldots\ldots\ldots\ldots i = 1, 2 \ldots 9 \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5)$$

Where $\overline{Inv_i} = T^{-1}\sum_{t=1}^{T}\overline{Inv_i}$ and similarly for the regressors.

Subtracting equation (5) from equation (4) for each *t,* we get the time-demeaned equation for each *i.*

$$Inv1_{it} - \overline{Inv}1_i = \beta_1 (F_{it} - \bar{F}_i) + \cdots + \beta_2 (X_{it\mathrm{k}} - \bar{X}_{ik}) + (\varepsilon_{it} - \bar{\varepsilon}_i), \ldots\ldots \text{t= 1, 2,..T...} \quad (6)$$

Where $\mathrm{Inv1_{it}} - \overline{\mathrm{Inv}}1_{\mathrm{i}}$, is the time-demeaned data on *Inv* and similarly for the independent variables.

Since $\mu_i - \bar{\mu}_i = 0$ the fixed effect is eliminated. Note also that there is no intercept in equation 6 since it is removed by the FE transformation.

The investment model to be estimated with interacting term (financial depth and financial stability and with a lagged investment variable is given as;

$$Inv_{it} = \beta_0 + \beta_1\left[\left(lagInv_{i,t-1}\right)\right] + \beta_2\left[\left(H\_Cap_{i,t-1}\right)\right] + \beta_3 \ln[\left(Find\_FStab_{i,t}\right)] + \beta_4 Fin\_Dep_{i,t} + \beta_5 F\_Stab'_{it} + \beta_6 X_{it} + \mu_i + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots (7)$$

4.2.2. Estimating the Growth Model

In the same way we estimated the investment model, we repeat the procedure in equation 4, 5 and 6 for the growth regression to get:

$$\boldsymbol{Y_{it} - \bar{Y}_i = \beta_1(F_{it} - \bar{F}_i) + \beta_2(Fin\_Inv_{it} - \overline{Fin\_Inv_i} + .. + \beta_3 (X_{it} - \bar{X}_i) + (\varepsilon_{it} - \bar{\varepsilon}_i)} \ldots\ldots\ldots (8)$$

Where, ***Fin_Inv*** is the interaction between financial deepening and investment in real sector. The coefficient of interest, *Fin_Inv,* is expected to be positive and measure the direction of causality between financial depth, investment and growth. Equation (8) estimates the impact of financial deepening on per capita GDP growth using investment in real sector mediator term.

Our augmented model for estimation can be re-written as:

$$\ln GDPpc_{it} = \beta_0 + \beta_1 F_{i,t} + \beta_2 Fin\_Inv_{i,t} + \cdots + \beta_3 X_{i,t} + \mu_i + \varepsilon_{i,t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

$$LnGDPpc_{it} = \beta_0 + \beta_1\left[\left(GDPpc_{i,t-1}\right)\right] + \beta_3 \ln[\left(Fin\_Inv_{i,t}\right)] + \beta_4 Fin\_Dep_{i,t} + \beta_5 Inv_{it} + \beta_6 X_{it} + \mu_i + \varepsilon_{it} \ldots\ldots (10)$$

(9) $\xrightarrow{\text{yields}}$ (10)

CHAPTER FIVE

5.0. SUMMARY OF EMPIRICAL RESULTS, LIMITATIONS, CONCLUSION AND POLICY IMPLICATIONS

The objective of this study was to establish the channels through which financial deepening impacts growth in a sample of nine frontier economies of sub-Saharan Africa. Specifically, the main interest was to determine the centrality of investment in the real sector in enhancing the role of the financial sector in growth of GDP per capita. In addition, the study sought to investigate whether financial stability enhances investment.

This section presents findings for the panel data estimations for 8 frontier economies of SSA. The original data set consisted of 9 countries, but due to data constraints Zambia was excluded. In the investment model, Nigeria was excluded since observations for human capital variable were missing for all the years under observation. Similarly, Namibia was excluded in the growth regression due to missing data on external debt, which was one of the control variables in the regression. Hence, the estimated results relates to a panel of 7 countries in each of the models. Table (4) presents the summary statistics, tables (5), (6) and (7) gives the estimation results.

5.1. Summary: Investment Model

Table (5) reports the panel unobserved effects results for the investment model under alternative specifications (1) - (4), without a one-year lag of investment. The finance variable in table (5) is the totality of financial deepening considered as a sum of market capitalization, domestic credit to the private sector, and liquid liabilities (or broad money-M3/GDP), all as given in percent of GDP. The aim of this investment model was to determine the role of financial depth in investment in the real sector. Controlling for financial stability tells us whether or not the soundness of the financial sector is important for real economic activity.

The results in table (5) column (1) to (4) (when no lag is introduced) do not provide evidence of the importance of financial depth in enhancing investment. Interestingly, the coefficient of financial stability is significantly negative at 1% for specification (1) - (3). The result in specifications (1) and (2) shows that a one standard deviation of financial stability leads to roughly 0.4% percent reduction in investment. This interpretation is not analogous to logical expectation. Nonetheless, a theoretical presumption can be made that placing too much emphasis on financial stability hurts investment. How can this possibility be explained? Part of the reason can be found in two possible scenarios. First, all else being equal, too much tightening of monetary policy for unnecessarily too long a time (to control excessive lending, check inflation, and therefore achieve financial stability) can be counterproductive; large interest rates only leave lesser financial resources for investment in the real economy. In other words, monetary and fiscal authorities may fear that easing monetary policy could expose the system to financial market vulnerabilities, hence, justifying tighter control. Secondly, in an attempt to maximize returns,

lenders could be bent on maintaining high interest rate spread. Banks' balance sheet would seem healthy but the returns to investor capital could be inhibitive of expansion.

However, when financial depth is interacted with financial stability, the coefficient of the interacting term is positive and significant at 1%. A one unit standard deviation change in the interactive effects of financial depth and financial stability leads to an 8% increase in investment. Other things equal, the multiplicative effect of financial stability and financial depth confers a stronger relationship between financial depth and investment. This evidence is also robust and consistent when under a lagged investment variable, as shown in table (6) and with more control variables added to the equation; the coefficient of interaction term remains stable. Taken individually, financial depth alone does not seem to support investment.

In the second set of specifications, table (6), I introduce a lagged dependent variable (investment) into the same specifications as in table (5). The results are evidential of the expectation that investment in year *t* depends on investment in year *t-1* even when under alternative specifications and controlling for exchange rate, human capital, and financial stability. Public sector variable (G_fce) is positive and significant at 5% when no lag of investment is specified (see table 5). Introducing a one year lag of investment (table 6) does not change the outcome.

5.2. Summary: The Growth Model

In the growth model, my interest was to import the investment and financial variables from the investment model and check for the significance of investment in facilitating the financial sector in economic growth. Table (7) gives the outcomes of the growth regression under different scenarios. Column (1) presents the growth specification in the absence of a lag of GDP per capita. In column (2) – (4), I introduce a lagged GDP per capita to control for endogeneity concerns. At the aggregate growth level, no significant impact of lagged GDP per capita is observed. The investment variable loses the 1% significance when lagged GDP per capita is introduced into the equation, but still retains its significance at 5 %. Its coefficient is, however, low, meaning that although the results attach significance to the variable, the impact on growth is positively low under the scenario of lagged GDP per capita.

A striking observation is that financial deepening (individually) loses significance when the interaction term is introduced [specification (3)] and when year dummy is introduced [specification (4)]. This may be indicative of the correlation between financial deepening and the interacting term. Nonetheless, the interaction term is positive and significant at 5%; a one standard deviation of interaction term leads to 2% increase in GDP per capita. This provides evidence of a strong link between financial sector, real sector, and economic growth in frontier economies. The direction of causality is from financial depth to investment in real sector to growth. The openness to trade variable seems to dampen growth; it is negatively significant at 1%. However, the coefficient is weak; a one unit increase in openness to trade leads to a 0.005% decrease in GDP per capita. This result could point to the fact that frontier economies of SSA are increasing relying on imported goods. That means savings decrease and investment in tradable

goods sector, for example, is declining. The negative coefficient might be a result of adverse terms of trade and debt convulsions in frontier economies; frontier economies' balance of payment and debt positions could be worsening. This result needs to be interpreted with caution as the coefficients for both openness to trade and long term external debt are small.

Nevertheless, the above evidence gives credence to the hypothesis that investment in the real sector is crucial to growth when one compares the significance in the results as we move from financial deepening to investment to growth. Haiss, Juvan, and Mahlberg (2011:28) also notes that "investment is a good predictor of growth", although their sample is for a developed region.

In order to affirm the centrality of channeling financial resources to the real sector activity, I conducted a margins plot (linear predictions based on regression) to show how economic growth would behave when we channel financial resources to real activity under different levels of financial depth and investment. The margins plot (presented in, figure 2) predicts GDP growth rates against the means of all the other factors and changes in investment under high and low financial depth. For purposes of prediction, I hypothetically define low financial depth as 40% of GDP and high financial depth as 120% of GDP (the sum of market capitalization, credit to private sector, and liquid liabilities). One could still generate alternative points to represent low and high financial depth and still obtain similar outcomes (predictions). The result clearly indicates that GDP growth rate is slower under low financial depth-low investment scenario. The opposite is true; growth rate is high in an environment of interaction between high financial depth and concomitant financial flows to real sector. The two trends (low and high financial deepening) indicate tilting of the slope of growth in alternative scenarios. The

slope of growth is flatter under low financial depth-investment interaction, and the reverse is also true.

In order to test for differences in year dummies, I conducted F-test for year dummy. My interest was to observe whether there are any significant differences in GDP per capita growth rates between successive years. The results show that the trend in GDP per capita growth remained positive. In addition, one would have expected some noticeable losses in GDP during the years 2009-2010/11 as a result of the global financial meltdown; the test fails to reject the null hypothesis that there were no significant differences in respective year coefficients. However, caution is warranted in interpreting the results as the effects may have taken longer, and may have been spread across sectors rather than at the aggregate accounting level.

In summary, the findings do not strongly support the idea that growth is achieved through financial deepening alone; the question of *how* finance achieves this is presented in this study. Compared to other channels, such as openness[32] to trade and financial stability, investment in the real sector stands out as the main channel in which finance can play a greater role in the frontier markets of SSA when introduced alone and with the interacting term. The investment model clearly shows that the multiplicative effect of financial depth and financial stability is positive and significant. It is safe then to infer that financial stability is significant for growth in a combined policy that deepens finance and upholds the soundness of the system.

[32] This is not the focus channel of this paper

5.3. Limitations of the Study

A number of limitations exist for this study. One, the study does not include the period 2012-2014, a period in which SSA (particularly the frontier economies) has made great strides in institutional financial sector and fiscal reforms, and in improving macroeconomic policy apparatus. This period may give a different picture of the role of finance in growth. Data constraints could not allow this researcher to include this period. Second, and for the same data reasons, the study does not include the importance of macroprudential regulations in enhancing the stability of the financial sector, a factor that is now important given the potential negative role that financial fragility can have on growth. Third, the financial depth used is narrow; the results would have been more precise if portfolio equity and debt securities for both public and private sector could be included in the measure for total financial depth and intermediation, for example, as adopted in Haiss, Juvan, Mahlberg (2011).

Similarly, the proxy for real sector activity may not be so accurate given the fact that increases in gross fixed capital formation may not necessarily be beneficial for growth. For instance, one could think of examples of additional fixed capital that does not bring returns to the economy, or that may actually drain financial resources that would have better opportunity costs if invested in alternative projects. Think of an empty hospital, a mis-prioritized highway construction, an empty library (or one stocked with irrelevant materials), or acquisition of obsolete equipment; such projects do not offer real returns to the economy yet they are additions to capital stock. A better measure of real activity would be annual industrial production. However, data on industrial production is not readily available for the sample countries.

5.4. Conclusion and Policy Recommendations

In this paper, I pursue the idea that the nexus between financial deepening and per capita growth lies in the multiplicative role of the financial development and investment in the real sector. The study purposively sampled 9 frontier economies of SSA with the objective of investigating the impact of investment on economic growth of these countries for the period 2001-2011. The second objective (which I answer in the first step - the investment model) is to estimate the importance of financial stability and financial depth in the real economy.

In this study, I contribute to the theoretical and empirical literature pertaining to financial deepening and growth around the globe and in SSA. In addition, the thrust of literature reviewed in this study lies in the fact that financial stability literature is included in the understanding of the finance–growth relationship. An aggregate financial depth [domestic credit to private sector, market capitalization and broad money (M3/GDP)] variable is adopted and alternative specifications are analyzed in a stepwise manner.

The study follows the standard growth model introduced in Barro (1991) and extended in Levine (1993) and proceeds in a two-step version. The first is the empirical analysis of the investment equation to interrogate the role of financial depth in investment. In this model, the multiplicative effect of financial depth and financial stability (bank-*z*-*score*) on investment is measured. The second uses the investment and financial depth, to examine the role each of the variables play on growth. The finance and investment variables are then interacted and the coefficient estimated to check the significance.

The first conclusion we can draw from the regression results is that the link between financial deepening and economic growth in SSA frontier markets is evidentially weak; the growth model does not establish a negative causality between financial depth and economic growth but, nonetheless, the positive coefficient is small. This result is consistent with other findings (e.g. Gries, T., Kraft, M., and Meierrieks, D., (2009), which do not find support for the finance-led growth hypothesis. However, this suggests that the channels through which finance executes its functions could be important for growth. The objective of this paper was to examine two of those channels (i) allocating resources to productive sectors (investment), and (ii) risk management (financial stability). This brings us to the second conclusion of this paper: that financial deepening significantly and positively impacts growth through the real economy.

In interpreting these results, it is worth revisiting the very question of what role do available financial resources play. It is obvious at the outset that efficient capital allocation is the theoretical presumption behind the claim of the positive role of finance on growth. What is going to be the use of newly available financial resources is determined by economic agents. For example, they could decide to use it for import, speculation, or consumption. These actions have impacts on macroeconomic balances (e.g. Terms of trade) and exchange rates. As imports rise, investment goes down and trade balance worsens. In this situation, savings decline more than investment in the capital account equation. Declining savings means that spending on imported, rather than domestically produced goods, increases. These possibilities can be explained with reference to financial depth. For example, adverse terms of trade shock that leads to energy and food import pushes up the prices of these and other goods. What role would financial depth play in this context? On the one hand, a more deep financial system would facilitate easier smoothening of consumption relative to shocks. In this case, adjustments would be less severe.

On the other hand, adjustments would be more draconian in a less developed financial system. Hence, this study argues for a more developed financial system that channels resources to the domestic tradable goods sector, as this would not only facilitate faster growth, but also ease adjustments in times of economic shocks.

A deep financial system that serves the real sector in itself is not good enough. Strong financial regulation and careful capital control measures should be implemented to ensure that financial deepening from capital inflows serve the real sector and not speculative exuberance. Arguably, the basic functions of finance remain crucial. However, the growing inflows of capital[33], coupled with an Africa that is fast immersing into the fragile world of financial globalization, warrants due consideration. Furthermore, there is a need for research on the most effective macroprudential policy mix that fairly fits the region.

Moreover, the financial innovation that has emerged in SSA, such as the mobile-phone banking revolution in Kenya and other countries, calls for exigent attention among empirical researchers. Further research could investigate the new role that financial innovations and digital banking plays in economic growth and development in frontier regions and other developing economies. Specifically, research could help develop a new composite annual index that captures the totality of financial development (access, depth, efficiency, and stability). This could produce interesting empirical findings that are relevant to policy. Finally, the importance of "curb markets" emphasized by Buffie (1984), need to be incorporated in finance-growth estimations to measure its role in the transmission mechanism between financial deepening and the real sector.

[33] See chart 3 in appendix

APPENDICES

Table 3: Variable Definition, Description and Source[34]

Variable Name	Definition/Description	Source
Dependent Variable: GDP per capita: (lnGDPpc)		
Macroeconomic Variables		
GDP_Pc	Gross domestic product divided by mid-year population (Annual)	World Development Indicators (WDI)
Ex_Rate_F	Exchange rate, national currency/USD (market + estimated) filtered for cyclicality	Penn World Tables at www.ggdc.net/pwt
Open_T	Ratio of sum of exports and imports to GDP	IFS, WDI, authors construction
Debt_ExLt	Public sector long-term external debt. It has an original or extended maturity of more than one year, is owed to nonresidents by residents of an economy and repayable in currency, goods, or services. Data are in current U.S. dollars.	World Bank
CrDB_toPriv	The financial resources provided to the private sector by domestic money banks (% of GDP)	IFS, IMF, GFDD
Dom_Crdt-priv	Domestic credit to private sector (% of GDP). These are financial resources advanced to the private sector for example through loans, purchases of non-equity securities, and trade credits and other accounts receivable that establish a claim for repayment.	GFDD, WDI
Li-Lib	Liquid liabilities to GDP (%). This is broad money or M3	GFDD
Mkt_Cap	Total value of all listed shares in a stock market as a percentage of GDP.	GFDD, WDI
Fin_Dep	Financial Depth indicates **t**otal measure of financial deepening. I Construct a simple GDP weighted index using three measures: **private credit, market capitalization and liquid liabilities. Data is** from WDI**, GFDD. Private credit and market capitalization has been used by Haiss, Juvan, Mahlberg (2011:23).**	Authors calculation based on World Bank Development Index, **Haiss, Juvan, Mahlberg (2011:23).**
Fin_Stab	Financial Stability measured by z- score. It captures the probability of default of a country's banking system. Z-score compares the buffer of a country's banking system (capitalization and returns) with the volatility of those returns	GFDD, Bankscope, Bureau van Dijk (BvD
G_Fce	Government final consumption expenditure.	World Bank
Investment	**Dependent variable in investment model, independent variable in growth model**	
Inv	Gross Fixed Capital Formation (%of GDP Gross fixed capital formation includes land improvements, plant, machinery, and equipment purchases; and construction net acquisitions of valuables	World Bank data
Pol_Stab	**Political Stability -**Polity2 index (democratic score minus autocratic score.	Beck et al. (2010), Marshall and Jaggers, (2010), Beck and Demirgüç-Kunt, (2009)
Microeconomic Variables		
H_Cap	An index of human capital per person, based on years of schooling (Barro/Lee, 2012) and returns to education (Psacharopoulos, 1994)	Penn World Tables 8.1

Source: Author's construction using different sources

[34] *Dom_Crdt-priv, Li-Lib and Mkt_Cap* are combined to form total financial depth (*Fin_Dep)*. Note that in this case financial depth is different from financial intermediation in the sense that liquid liabilities are not included in defining intermediation.

Table 4: Summary Statistics, 2001-2011, Annual Data

Variables	Obs	Mean	Std. Dev	Min	Max
lngdp	96	7.19286	1.025848	5.890705	8.778607
lagGDPpc	88	2187.179	2099.001	361.66	6291.25
inv	96	20.07969	7.304425	5.46	34.91
laginv	88	19.83886	7.255303	5.46	34.91
fin_dep	96	87.84094	53.49632	22.66	257.68
open_t	96	80.53198	25.48203	33.49	131.38
debt_exlt	84	6.30E+09	6.99E+09	3.60E+08	3.30E+10
ex_rate	96	245.4544	396.7487	0.54	1572.12
polity_2	96	5.135417	3.765829	-2	10
f_stability	96	13.75062	7.819136	-4.14	41.53
lnfind_fstab	95	6.789361	0.8839	4.323735	8.591541
H_Cap	84	2.202024	0.3136562	1.68	2.85
contr_corr	87	-0.25527	0.750499	-1.33328	1.249671
G_fce	96	15.13583	4.653489	5.15	25.57

Source: Author's calculations using Stata.

lnGDP= annual GDP per capita growth (log value)**; LagGDPpc=** one year lag of annual growth in GDP per capita; **Inv**= Gross fixed capital formation; **laginv**= one year lag of gross fixed capital formation; **Fin_Dep**= Financial deepening; **F_stability**=Financial stability (bank z-score); **Ex rate**= exchange rate (nominal); **G_fce**= Government final consumption expenditure; **Polity2**= democratic score; **Open_T**=openness to trade; **lnfinD_Fstab**=interaction term between financial stability and financial depth; **Cont_Corr**= control of corruption.

Table 5 : Investment Model (No Lag)

Finance variable: Financial depth, financial stability, interaction term (i.e. financial depth and financial stability)
Dependent Variable- Investment

VARIABLES	(1) inv	(2) inv	(3) inv	(4) inv
fin_dep	-0.00210	-0.0101	-0.0234	-0.0351
	(0.0307)	(0.0253)	(0.0198)	(0.0207)
f_stability	-0.417***	-0.456***	-0.340***	-0.586**
	(0.0441)	(0.0754)	(0.0880)	(0.168)
ex_rate_F	0.0111***	0.0127***	0.0116***	0.00941**
	(0.00236)	(0.00158)	(0.00276)	(0.00320)
h_cap	9.664	8.397	15.94*	13.74
	(11.62)	(10.23)	(7.230)	(12.94)
g_fce	0.287**	0.317**		
	(0.100)	(0.201)		
polity_2	-0.433***	-0.393***	-0.213*	-0.391
	(0.0984)	(0.0899)	(0.104)	(0.821)
lnfind_fstab	8.453***	8.861***	8.781***	8.091***
	(0.934)	(1.443)	(1.409)	(0.823)
open_t			0.104**	
			(0.0290)	
contr_corr				-0.801
				(2.332)
reg_qlty				1.558
				(1.594)
Constant	-57.46**	-52.19**	-64.18***	-74.58***
	(20.99)	(16.17)	(12.88)	(15.17)
Observations	84	84	84	73
R-squared	0.668	0.646	0.722	0.662
Number of countrycode	7	7	7	7

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Inv= Gross fixed capital formation; **Fin_Dep**= Financial deepening; **F_stability**=Financial stability (bank z-score); **Ex rate_F**= exchange rate (filtered for fluctuations); **G_fce**= Government final consumption expenditure; **Polity2**= democratic score; **Open_T**=openness to trade; **lnfinD_Fstab**=interaction term between financial stability and financial depth (log terms); **Fin_Inv**= Financial intermediation (market capitalization+ domestic credit to private sector; **Cont_Corr**= control of corruption.

Note: Nigeria is excluded in the investment model since observations for human capital are not available for all the years of interest.

Table 6: Investment Model with one Year Lag and with Interacting Term

Dependent Variable- Investment**; Finance variable**: Financial depth, financial stability, interaction term (i.e. financial depth and financial stability)

VARIABLES	(1) Fe1 inv	(2) Fe2 inv	(3) Fe3 inv	(4) Fe4 inv
lagin	0.305**	0.355**	0.277	0.383**
	(0.104)	(0.127)	(0.149)	(0.125)
fin_dep	-0.000230	-0.00569	-0.0151	-0.0234
	(0.0204)	(0.0162)	(0.0227)	(0.0198)
f_stability	-0.384***	-0.403***	-0.303***	-0.600**
	(0.0590)	(0.0859)	(0.0666)	(0.179)
ex_rate	0.00809***	0.00856***	0.00854**	0.00596**
	(0.00168)	(0.00159)	(0.00256)	(0.00205)
h_cap	2.685	0.670	9.053	-1.644
	(5.597)	(5.872)	(8.828)	(9.140)
g_fce	0.255**	0.286**		
	(0.101)	(0.109)		
polity_2	-0.425**	-0.391**	-0.279**	-0.215
	(0.133)	(0.147)	(0.112)	(0.605)
lnfind_fstab	7.089***	7.087***	7.559***	7.716***
	(1.377)	(1.849)	(1.902)	(1.953)
open_t			0.0891**	
			(0.0283)	
contr_corr				-1.677
				(1.552)
reg_qlty				4.057
				(2.118)
Constant	-38.40***	-30.40**	-45.20*	-40.14**
	(5.421)	(10.08)	(19.87)	(15.71)
Observations	77	77	77	69
R-squared	0.706	0.689	0.740	0.700
Number of countrycode	7	7	7	7

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Inv= Gross fixed capital formation; **Fin_Dep**= Financial deepening; **F_stability**=Financial stability (bank z-score); **Ex rate_F**= exchange rate (filtered for fluctuations); **G_fce**= Government final consumption expenditure; **Polity2**= democratic score; **Open_T**=openness to trade; **lnfinD_Fstab**=interaction term between financial stability and financial depth (log terms); **Fin_Inv**= Financial intermediation (market capitalization+ domestic credit to private sector; **Cont_Corr**= control of corruption.

Note: Nigeria is excluded in the investment model since observations for human capital are not available for all the years of interest.

Table 7: Growth Regression: Specification (4) has Year Dummy.

Dependent variable- growth in GDP per capita (log terms)

VARIABLES	(1) gdp1 (no lag)	(2) gdp2 (1 year lag of lnGDPpc)	(3) gdp3 (interaction term with 1 year lag lnGDPpc)	(4) gdp4 (interaction term, 1 year lag of LnGDPpc with year dummy)
lngdp1		0.00129	0.00295	0.00496
		(0.0121)	(0.0144)	(0.0126)
inv	0.00821***	0.00808***	0.00662*	-0.00470*
	(0.00169)	(0.00188)	(0.00311)	(0.00199)
fin_dep	0.00285	0.00284*	0.00230*	-0.00159
	(0.0254)	(0.0251)	(0.00105)	(0.00116)
c.inv#c.fin_dep			2.26e-05**	9.56e-05**
			(3.98e-05)	(3.86e-05)
open_t	-0.00541***	-0.00538***	-0.00524***	-0.00334**
	(0.000928)	(0.000936)	(0.00105)	(0.00125)
debt_exlt	-0***	-0***	-0***	-0***
	(0)	(0)	(0)	(0)
ex_rate	0.000380***	0.000383***	0.000387***	0.000409**
	(3.19e-05)	(3.80e-05)	(4.44e-05)	(0.000115)
polity_2	-0.000777	-0.000768	-0.000475	-0.00393
	(0.00233)	(0.00261)	(0.00240)	(0.00289)
2001.year				0.0171
				(0.0110)
2002.year				0.0123
				(0.0186)
2003.year				0.0402*
				(0.0195)
2004.year				0.104**
				(0.0335)
2005.year				0.112***
				(0.0173)
2006.year				0.0895***
				(0.0185)
2007.year				0.136***
				(0.0248)
2008.year				0.169***
				(0.0305)
2009.year				0.139***
				(0.0339)
2010.year				0.178***
				(0.0474)
2011.year				0.236**
				(0.0651)
Constant	7.006***	6.997***	7.032***	7.178***
	(0.0753)	(0.140)	(0.174)	(0.105)
Observations	84	83	83	83
R-squared	0.795	0.792	0.793	0.891
Number of countrycode	7	7	7	7

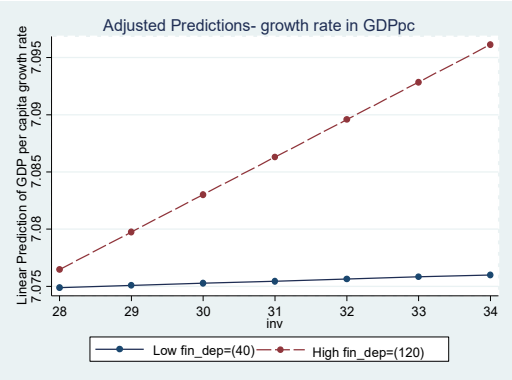
Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: (i) *Namibia is excluded in the growth model due to lack of observations on the external debt variable which is a control variable in the growth regression.*

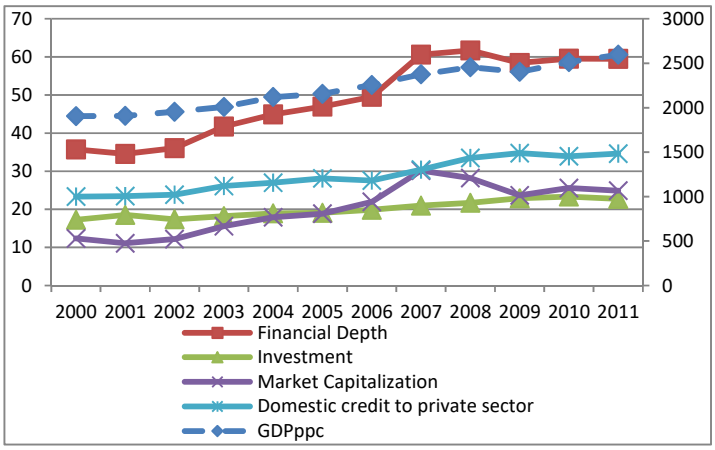
(ii). c.inv#c.fin_dep= *Interacting term (i.e product of investment and financial depth variable)*

Figure 1: Adjusted Predictions for Interaction between Investment and Financial Depth



Source: Author's construction using Stata

Figure 2: Trend in Key Macroeconomic Variables, Frontier Economies (2000-2011)



Source: Author's Construction using data from GFDD, WDI

Chart 2: Real GDP growth, 1995-2013

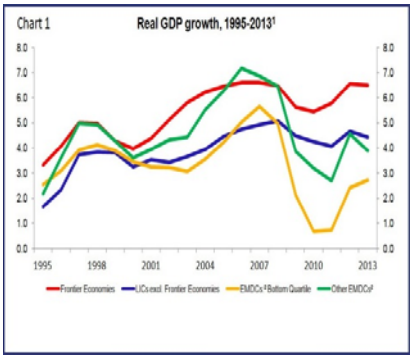


Chart 3: Inflation, percentage, 1995-2013

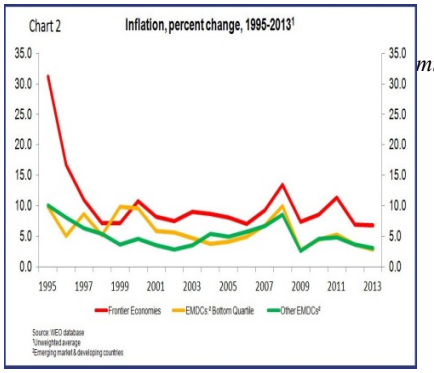
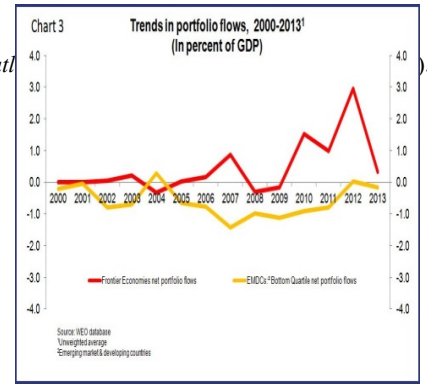


Chart 1: Trends in Portfolio Flows, 2000-2013 (%of GDP)



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